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- (54) Title of the invention: Picture voice encoding device and picture voice recording and reproducing device
- (57) Abstract:

Problem to be solved: To obtain a picture voice encoding device and a picture voice recording and reproducing device where a picture and voice can be collectively encoded and also a lip-synch circuit is unrequired with a small circuit scale by prescribed circuit configuration.

Solution: A picture A/D converter 14 converts an analog picture signal inputted from an inter terminal T1 into digital picture data, a voice A/D converter 15 converts an analog voice signal inputted from the input terminal T2 into digital voice data and a line memory 16 temporarily stores digital voice data outputted from a voice A/D converter 15. A route change-over switch 17 connects a frame memory to the picture A/D converter 14 or a line memory 16.

The frame memory 18 stores digital picture data outputted from the picture A/D converter 14 and digital voice data outputted from the line memory 16. An encoding circuit 19 compresses and processes digital picture/voice data.

### [Claims]

#### [Claim 1]

A picture voice to digital converter including: a picture A/D converter that changes an analog picture signal into digital image data, a voice A/D converter that changes an analog voice signal into digital sound data, a line memory that stores temporarily the mentioned above digital sound data outputted from the mentioned above voice A/D converter, a frame memory that stores the mentioned above digital sound data outputted from the mentioned above digital image data outputted from the mentioned above picture A/D converter, and the mentioned above line memory, an encoding circuit that carries out compression processing of the mentioned above digital image data and the mentioned above digital sound data outputted from the mentioned above frame memory, the mentioned above digital image data outputted from the mentioned above picture A/D converter is made to write in a field equivalent to an image display region of the mentioned above frame memory, a route change-over switch that changes a route, so that the mentioned above digital sound data outputted from the mentioned above line memory may be made to write in a field equivalent to picture non display regions of the mentioned above frame memory.

[Claim 2]

The provided picture voice to digital converter according to claim 1 is arranged between the mentioned above voice A/D converter and the mentioned above line memory, a subtractor that outputs digital difference data that is the difference of the mentioned above digital sound data outputted from the mentioned above voice A/D converter, and digital sound data in front of the mentioned above digital sound data outputted from the mentioned above voice A/D converter to the mentioned above line memory.

[Claim 3]

The picture voice recording playback equipment including: a picture A/D converter that changes an analog picture signal into digital image data, a voice A/D converter that changes an analog voice signal into digital sound data, a line memory that stores temporarily the mentioned above digital sound data outputted from the mentioned above voice A/D converter, a frame memory that stores the mentioned above digital sound data outputted from the mentioned above digital image data outputted from the mentioned above picture A/D converter, and the mentioned above line memory, an encoding circuit that carries out compression processing of the mentioned above digital image data outputted from the mentioned above frame memory, and the mentioned above digital sound data, the mentioned above digital image data outputted from the mentioned above picture A/D converter is made to write in a field equivalent to an image display region of the mentioned above frame memory, a recorder that records

collectively a route change-over switch that changes a route, so that the mentioned above digital sound data outputted from the mentioned above line memory may be made to write in a field equivalent to picture non display regions of the mentioned above frame memory and image code data and sound code data that are outputted from the mentioned above encoding circuit.

[Claim 4]

Picture voice recording playback equipment including: a recording medium that bundles up and records image code data and sound code data, a decoding circuit that decodes image code data and sound code data that are outputted from the mentioned above recording medium to digital image data and digital sound data, a frame memory that writes the mentioned above digital image data outputted from the mentioned above decoding circuit, and the mentioned above digital sound data in a field equivalent to a field and picture non display regions equivalent to an image display region, a picture D/A converter that changes into an analog picture signal the mentioned above digital image data outputted from the mentioned above frame memory, a line memory that stores temporarily the mentioned above digital sound data outputted from the mentioned above frame memory, a voice D/A converter that changes into an analog voice signal the mentioned above digital sound data outputted from the mentioned above line memory, a route change-over switch that changes a route, so that it may connect with the mentioned above line memory, when it connects with the mentioned above picture D/A converter when the mentioned above digital image data

is outputted from the mentioned above frame memory, and the mentioned above digital sound data is outputted from the mentioned above frame memory.

[Claim 5]

A transmission part, a receive part and a picture and a line circuit that transmits and receives audio code data via a communication line an image voice communication device that it includes, and the mentioned above transmission part, a picture A/D converter that changes an analog picture signal into digital image data, a voice A/D converter that changes an analog voice signal into digital sound data, a transmission line memory that stores temporarily the mentioned above digital sound data outputted from the mentioned above voice A/D converter, a transmitting frame memory that stores the mentioned above digital sound data outputted from the mentioned above digital image data outputted from the mentioned above picture A/D converter, and the mentioned above line memory, an encoding circuit that carries out compression processing of the mentioned above digital image data outputted from the mentioned above transmitting frame memory, and the mentioned above digital sound data, the mentioned above digital image data outputted from the mentioned above picture A/D converter is made to write in a field equivalent to an image display region of the mentioned above transmitting frame memory, it includes a transmitting side route change-over switch that changes a route, so that the mentioned above digital sound data outputted from the mentioned above transmission line memory may be made to write in a

field equivalent to picture non display regions of the mentioned above transmitting frame memory, the mentioned above line circuit outputs code data of a picture and a sound that code data of a picture outputted from the mentioned above encoding circuit and a sound was transmitted to a communication line and received from a communication line to the mentioned above receive part, a picture to which the mentioned above receive part is outputted from the mentioned above line circuit and a decoding circuit that decodes audio code data to digital image data and digital sound data, a receiving frame memory that writes the mentioned above digital image data outputted from the mentioned above decoding circuit and the mentioned above digital sound data in a field equivalent to a field and picture non display regions equivalent to an image display region, a picture D/A converter that changes into an analog picture signal the mentioned above digital image data outputted from the mentioned above receiving frame memory, a receiving line memory that stores temporarily the mentioned above digital sound data outputted from the mentioned above receiving frame memory, with a voice D/A converter that changes into an analog voice signal the mentioned above digital sound data outputted from the mentioned above receiving line memory, when the mentioned above digital image data is outputted from the mentioned above receiving frame memory, it connects with the mentioned above picture D/A converter, an image voice communication device that includes a receiver route change-over switch that changes a route, so that it may

connect with the mentioned above receiving line memory, when the mentioned above digital sound data is outputted from the mentioned above receiving frame memory.

[Detailed description of the invention]

[0001]

[Field of the invention] This invention relates to the image voice communication device that communicates the picture sound reproduction device and video that reproduce video and a sound, the picture voice to digital converter and video that codes a sound, the picture voice recording device that records a sound and the recorded video and a sound.

[0002]

[Description of the prior art] In recent years, a picture and audio digital coding technology progress and it is thought that it is also continued expand the spread of the video conference system that applied this to the telecommunications sector, CD-ROM, CDV that were made into the storage medium, etc.

[0003]

Conventionally, what is shown on drawing 8 is known as an image voice communication device. In drawing 8, picture A/D converter 1 changes into digital image data the analog picture signal inputted from the input terminal T1, the transmitting frame memory 2 stores the digital image data outputted from picture A/D converter 1, and the image encoding circuits 3 compress the digital image data outputted from the transmitting frame

memory 2 and code it. Voice A/D converter 4 changes into digital sound data the analog voice signal inputted from the input terminal T2 and the voice encoding circuit 5 codes the digital sound data outputted from voice A/D converter 4. The code data that the demultiplexing circuit 6 multiplexed the code data of the picture outputted from the image encoding circuits 3 and the voice encoding circuit 5 and a sound, and transmitted to the opposite party device, and was received from the opposite party device is divided into the code data of a picture and a sound. The line circuit 7 connects the demultiplexing circuit 6 and a communication line. The picture decoding circuit 8 decodes the image code data from the demultiplexing circuit 6 to digital image data, the receiving frame memory 9 stores the digital image data outputted from the picture decoding circuit 8 and picture D/A converter 10 changes into an analog picture signal the digital image data outputted from the receiving frame memory 9 and it outputs it from output terminal T3. The voice decoding circuit 11 decodes the sound code data from the demultiplexing circuit 6 to digital sound data and voice D/A converter 12 changes the digital sound data from the voice decoding circuit 11 into an analog voice signal and it outputs it from the output terminal T4. The control circuit 13 controls the image encoding circuits 3, the voice encoding circuit 5, the picture decoding circuit 8, the voice decoding circuit 11, the demultiplexing circuit 6 and the line circuit 7.



[0004]

The operation is explained about the image voice communication device constituted as mentioned above. A send action is explained first. Compression encoding of the digital image data for one frame stored by the transmitting frame memory 2 is carried out by the image encoding circuits 3. As a method of graphical data compression, ITU-T (International Telecommunications Union Telecommunication Standardization Part) advice H.261, MPEG (Moving Picture Experts Group), etc. are typical. A compressive algorithm is a thing using the redundancy of image data, by DCT (Discrete Cosine Transform) conversion, it performs conversion to a frequency component, quantizes and codes. In this way, image code data is outputted to the demultiplexing circuit 6. On the other hand, as compression technology of voice data, there are ITU-T recommendation G.711, G.722, G.728, etc. The compression algorithm of voice data uses ADPCM (Adaptive Differential Pulse Code Modulation). Sound code data is similarly outputted to the demultiplexing circuit 6 and image code data and sound code data multiplex it according to multiplex systems, such as ITU-T recommendation H.221, and it is transmitted to the other party image voice communication device through the line circuit 7.

[0005]

Next, receiving operation is explained. The image code data that will take the reverse operation procedures of transmission in reception, and was separated from the demultiplexing circuit 6 by the picture decoding circuit 8 inverse quantization, reverse DCT transformation is

performed, and it decodes digital image data, is written in the receiving frame memory 9, and is displayed on a monitor etc. from picture D/A converter 10. On the other hand, reverse ADPCM conversion is carried out by the voice decoding circuit 11 and sound code data is also outputted to a loudspeaker from voice D/A converter 12.

[0006]

An image voice communication device can perform communication according to a picture and a sound as mentioned above.

[0007]

[Problems to be solved by the invention] However, the mentioned above conventional image voice communication device has a problem that is described next. First, with the device, the circuit of coding of a picture, the circuit of decoding and audio coding, and decoding is separate conventionally. This is because the separate coding mode was developed when the feature of signals, such as a frequency band of a picture and a sound and a difference in the amount of information, had a difference. However, for this reason, it had the problem that circuit structure became large and the cost of a device became high.

[0008]

The time that coding and decoding processing of a picture take in picture voice communication, since the time concerning audio coding / coding processing is different (coding and the decoding processing time of a picture are longer since the amount of information of a

picture is large compared with the audio amount of information), the motion of a picture and the timing of voice response that were displayed shift and sense of incongruity occurs. For this reason, it had the problem that the circuit that delays voice data as this measure and performs the synchronization with a picture and what is called a lip sync circuit were required.

[0009]

In this image voice communication device, it is required that package coding of a picture and a sound should be possible, circuit structure should be small, and a lip sync circuit should be unnecessary.

[0010]

Package coding of a picture and a sound is possible for this invention, and a picture voice to digital converter with small circuit structure that does not need a lip sync circuit, a picture voice to digital converter and a picture voice recording device that circuit structure is small, so that package coding of a picture and a sound is possible, a lip sync circuit is unnecessary, and can record the code data of a picture and a sound collectively, and it aims at package coding and decoding of the picture sound reproduction device and picture that can reproduce the code data of the picture and a sound recorded collectively, and a sound being possible, and providing the image voice communication device with small circuit structure and that does not need a lip sync circuit.

[0011]

[Means for solving the problem] In this invention, a picture A/D converter changes an analog picture signal into digital image data in order to solve this technical problem, a voice A/D converter changes an analog voice signal into digital sound data, a line memory that stores temporarily digital sound data outputted from a voice A/D converter, a frame memory that stores digital sound data outputted from digital image data and a line memory that are outputted from a picture A/D converter, an encoding circuit that carries out compression processing of digital image data and digital sound data that are outputted from a frame memory, digital image data outputted from a picture A/D converter is made to write in a field equivalent to an image display region of a frame memory, it constituted, so that it might have a route change-over switch that changes a route, so that digital sound data outputted from a line memory may be made to write in a field equivalent to picture non display regions of a frame memory.

[0012]

Thus, package coding of a picture and a sound is possible, and a picture voice to digital converter with small circuit structure that does not need a lip sync circuit is obtained.

[0013]

[Embodiment of the invention] In the invention according to claim 1, the picture A/D converter changes an analog picture signal into digital image data, the voice A/D converter that changes an analog voice signal

into digital sound data, the line memory that stores temporarily the digital sound data outputted from a voice A/D converter, the frame memory that stores the digital sound data outputted from the digital image data and the line memory that are outputted from a picture A/D converter, the encoding circuit that carries out compression processing of the digital image data and digital sound data that are outputted from a frame memory, the digital image data outputted from a picture A/D converter is made to write in the field equivalent to the image display region of a frame memory, it supposes that it includes a route change-over switch that changes a route, so that the digital sound data outputted from a line memory may be made to write in the field equivalent to the picture non display regions of a frame memory and it includes the operation that compression encoding is collectively carried out by the digital data of a picture and a sound.

[0014]

The invention according to claim 2 is arranged between a voice A/D converter and a line memory in the invention according to claim 1, it is supposed that the subtractor that outputs the digital difference data that is the difference of the digital sound data outputted from a voice A/D converter and the digital sound data in front of that to a line memory is formed, it includes the mentioned above operation that compression encoding is collectively carried out by the digital data of a picture and a sound, and includes the operation that the amount of voice data decreases.

[0015]

In the invention according to claim 3, the picture A/D converter changes an analog picture signal into digital image data, the voice A/D converter that changes an analog voice signal into digital sound data, the line memory that stores temporarily the digital sound data outputted from a voice A/D converter, the frame memory that stores the digital sound data outputted from the digital image data and the line memory that are outputted from a picture A/D converter, the encoding circuit that carries out compression processing of the digital image data and digital sound data that are outputted from a frame memory, the digital image data outputted from a picture A/D converter is made to write in the field equivalent to the image display region of a frame memory, the route change-over switch that changes a route, so that the digital sound data outputted from a line memory may be made to write in the field equivalent to the picture non display regions of a frame memory, it supposes that it includes a recorder that records collectively the image code data and sound code data that are outputted from an encoding circuit and it includes the mentioned above operation that compression encoding is collectively carried out by the digital data of a picture and a sound and has the operation that code data is recorded.

[0016]

In the invention according to claim 4, the recording medium bundles up and records image code data and sound code data, the decoding circuit decodes the image code data and sound code data that are outputted from a

recording medium to digital image data and digital sound data, the frame memory that writes the digital image data and digital sound data that are outputted from a decoding circuit in the field equivalent to the field and picture non display regions equivalent to an image display region, the picture D/A converter that changes into an analog picture signal the digital image data outputted from a frame memory, the line memory that stores temporarily the digital sound data outputted from a frame memory, the voice D/A converter that changes into an analog voice signal the digital sound data outputted from a line memory, when digital image data is outputted from a frame memory, it connects with a picture D/A converter, it supposes that it includes a route change-over switch that changes a route, so that it may connect with a line memory, when digital sound data is outputted from a frame memory and it includes the operation that the code data of the picture collectively recorded on the recording medium and a sound is decoded.

[0017]

The invention according to claim 5 is a transmission part, a receiving part, and a picture and the line circuit that transmits and receives audio code data by a communication line an image voice communication device that it has, and a transmission part. The picture A/D converter that changes an analog picture signal into digital image data, the voice A/D converter that changes an analog voice signal into digital sound data, the transmission line memory that stores temporarily the digital sound data outputted from a voice A/D

converter, the transmitting frame memory that stores the digital sound data outputted from the digital image data and the line memory that are outputted from a picture A/D converter, the encoding circuit that carries out compression processing of the digital image data and digital sound data that are outputted from a transmitting frame memory, the digital image data outputted from a picture A/D converter is made to write in the field equivalent to the image display region of a transmitting frame memory, it includes a transmitting side route change-over switch that changes a route, so that the digital sound data outputted from a transmission line memory may be made to write in the field equivalent to the picture non display regions of a transmitting frame memory, a line circuit transmits the code data of the picture outputted from an encoding circuit and a sound to a communication line and it outputs the code data of the picture and sound that were received from the communication line to a receive part.

[0018]

The picture to which a receive part is outputted from a line circuit and the decoding circuit that decodes audio code data to digital image data and digital sound data, the receiving frame memory that writes the digital image data and digital sound data that are outputted from a decoding circuit in the field equivalent to the field and picture non display regions equivalent to an image display region, the picture D/A converter that changes into an analog picture signal the digital image data outputted from a receiving frame memory, the receiving line memory that stores temporarily the digital



sound data outputted from a receiving frame memory, the voice D/A converter that changes into an analog voice signal the digital sound data outputted from a receiving line memory, when digital image data is outputted from a receiving frame memory, it connects with a picture D/A converter, it is supposed that it includes a receiver route change-over switch that changes a route so that it may connect with a receiving line memory, when digital sound data is outputted from a receiving frame memory, compression encoding of the digital data of a picture and a sound is carried out collectively, and it includes the operation that extension decoding is carried out collectively.

[0019]

Next, an embodiment of the invention is described using drawing 1 - drawing 7.

(Embodiment 1) Drawing 1 is a block diagram showing the picture voice to digital converter by the 1 embodiment of this invention. In drawing 1, picture A/D converter 14 changes into digital image data the analog picture signal inputted from the input terminal T1, voice A/D converter 15 changes into digital sound data the analog voice signal inputted from the input terminal T2, and the line memory 16 stores temporarily the digital sound data outputted from voice A/D converter 15. The route change-over switch 17 connects the mentioned below frame memory 18, picture A/D converter 14 or the line memory 16. That is, the route change-over switch 17 determines the write timing of digital image data and digital sound data to the frame memory 18.

The frame memory 18 stores the digital sound data outputted from the digital image data and the line memory 16 that are outputted from picture A/D converter 14. The encoding circuit 19 carries out compression processing of the digital image data and digital sound data that are outputted from the frame memory 18.

[0020]

The operation is explained about the picture voice to digital converter constituted as mentioned above. CIF (Common Intermediate Format) that uses the digital image data from picture A/D converter 14 by H.261 as a method of writing in the frame memory 18 is explained as an example. CIF is the form of storing 1 frame 30-Hz image data and 1-pixel 16-bit composition with 352 pixels x 288 lines (line number including a vertical blanking period), in this case, since it is aimed only at the effective area of a picture, the sampling clocks 52.1  $\mu$ s (horizontal effective display time), it becomes a 352-pixel sampling and is set to 6.75 MHz. G.711 is explained to an example as a method of writing the digital sound data from voice A/D converter 15 in the frame memory 18. Since the zone of the audio signal in a telephone is about 3.5 kHz, it is sampling at 8 kHz. Since it is 8 bits per 1 sample, voice data serves as data volume of 8 kHz x 8 bits = 64k bps. Since it is 30 Hz per frame when writing this voice data in the frame memory 18, the data of  $8 \text{ kHz} / 30 \text{ Hz} = 267$  sample will be written in. Since it is 8 bits per 1 sample, voice data will occupy  $267 \times 8 / 16 = 133.5$  pixels, i.e., the field for 134 pixels, in the frame memory 18.

This is few fields that are less also than the half of the amount 352 of pixels of one scanning line. In pictorial communication, one frame is set to 15 Hz with the variation of a picture, the quantized value at the time of coding, transmission speed, etc., and CIF is in every direction, QCIF of a half pixel configuration may be used, respectively. In this case, according to the situation of image coding, it is necessary to change the field that voice data occupies like scanning line 1 duty or scanning line 2 duty.

[0021]

Next, the writing operation to the frame memory 18 is explained using drawing 2. Drawing 2 is a stored data drawing showing the memory state of the data in the frame memory 18. In drawing 2, V shows one frame image data, and the voice data corresponding to one-frame image data V in A, as for S1, the field (image data storage area) of the frame memory 18 where one-frame image data V is stored, and the field (voice data storage area) of the frame memory 18 where voice data A corresponding to one-frame image data V in S2 is stored are shown. In the effective display period of the picture, the route change-over switch 17 connects picture A/D converter 14 and the frame memory 18 and the digital image data from picture A/D converter 14 is written in the frame memory 18 one by one by the route change-over switch 17. On the other hand, the digital sound data from voice A/D converter 15 is written in the line memory 16. Since image data enters at a vertical blanking period and the writing of image data is no longer performed after the writing for one frame of the

digital image data to the frame memory 18 is completed, at this time, connection by the route change-over switch 17 is changed to the line memory 16 side and the digital sound data from the line memory 16 is written in the portion that does not have big influence on pictures, such as a field equivalent to the scanning line of the last of the frame memory 18 (see drawing 2). What is necessary is just to perform the writing from the line memory 16 to the frame memory 18, by the time the blanking period of image data expires.

[0022]

Although the image data and voice data that were written in the frame memory 18 as mentioned above are coded by the encoding circuit 19, it is effective that the algorithm of graphical data compression performs coding in this case since the rate of voice data over image data is very small. However, since the redundancy of the picture is lost about the picture and the block with which audio data is mixed, a possibility that audio decoding becomes impossible in the same compression as other image blocks is large.

Thus, about the picture and the block with which a sound is mixed, parameters, such as a quantized value, are set so that data can revert about 100%. Although a compression ratio will fall by this operation as compared with the coding only by the conventional image data, since the field that voice data occupies is a slight quantity called one to scanning line 2 duty as mentioned above, influence on a compression ratio fall is small.

[0023]

Since voice data was written in the field corresponding within the vertical blanking period of image data in the frame memory 18 as mentioned above according to this Embodiment 1, compression encoding of image data and the voice data can be carried out collectively. Thus, since the required voice encoding circuit 5 and the demultiplexing circuit 6 can be conventionally made unnecessary, circuit structure can be made small. Since batch processing of image data and the voice data can be carried out, a lip sync circuit becomes unnecessary and much more miniaturization can be achieved.

[0024]

(Embodiment 2) Drawing 3 is a block diagram showing the picture voice to digital converter by the 2nd embodiment of this invention. In drawing 3, since picture A/D converter 14, voice A/D converter 15, the line memory 16, the route change-over switch 17, the frame memory 18 and the encoding circuit 19 are the same as that of drawing 1, explanation is omitted. The digital sound data that the subtractor 20 is arranged between voice A/D converter 15 and the line memory 16 and is outputted from voice A/D converter 15, the digital difference data that is difference with the digital sound data (next “immediately before digital sound data”) in front of one of them in timing is outputted to the line memory 16.

[0025]

About the picture voice to digital converter constituted as mentioned above, the operation is explained using drawing 4 (a), (b). The voice sampling figure in which

drawing 4 (a) shows the sampling timing of an audio signal, and drawing 4 (b) are the difference data figures showing the digital difference data that is the difference of the sampled digital sound data and the immediately before digital sound data. Digital difference data is outputted from the subtractor 20, as mentioned above. Although the digital sound data sampled by voice A/D converter 15 is inputted into the subtractor 20 one by one, the subtractor 20 calculates the difference of the digital sound data inputted at a certain time and the immediately before digital sound data and outputs it as digital difference data. Namely, in drawing 4 (a), (b), difference  $\Delta$  of the sound level in the time  $T_n$  and the sound level in time  $T_{n+1}$  is calculated one by one, and it outputs to the line memory 16. Thus, the variation of voice data becomes less than an audio signal from the first by processing that takes difference. Thus, compression efficiency can be raised when coding by the encoding circuit 19.

[0026]

Since the difference of digital sound data and the immediately before digital sound data was taken with the subtractor 20 as mentioned above according to this Embodiment 2, variation of voice data can be made less than an audio signal from the first, and compression efficiency when coding by the encoding circuit 19 can be raised.

[0027]

(Embodiment 3) Drawing 5 is a block diagram showing the picture voice recording device by the 3rd embodiment of this invention. In drawing 5, since

picture A/D converter 14, voice A/D converter 15, the line memory 16, the route change-over switch 17, the frame memory 18, and the encoding circuit 19 are the same as that of drawing 1, explanation is omitted. The recorder 21 records collectively the code data of the picture and a sound outputted from the encoding circuit 19. The recording medium 22 is a magnetic disk, an optical disc according to the recorder 21. The control circuit 23 controls the route change-over switch 17, the frame memory 18, the encoding circuit 19 and the recorder 21.

[0028]

The operation is explained about the picture voice recording device constituted as mentioned above. Since the operation of the encoding circuit 19 is the same as that of the 1st embodiment in this device, operation after it is explained. The code data of the picture outputted from the encoding circuit 19 and a sound is collectively inputted into the recorder 21 and storing preservation is carried out at the recording medium 22 in the recorder 21.

[0029]

Although the subtractor 20 in the 2nd embodiment was not made into the component, it may be made to arrange the subtractor 20 between voice A/D converter 15 and the line memory 16 like the 2nd embodiment in this 3rd Embodiment.

[0030]

Since the coding data of a picture and a sound can be collectively recorded on the recorder 21 as an external

recorder as mentioned above according to this Embodiment 3, a database with a picture and a sound can be built.

[0031]

(Embodiment 4) Drawing 6 is a block diagram showing the picture sound reproduction device by a 4th embodiment of this invention. In drawing 6, the playback equipment 24 outputs the image code data and sound code data that are collectively recorded on the recording medium 22. The decoding circuit 25 decodes the code data of the picture and the sound from the playback equipment 24 and outputs digital image data and digital sound data. The frame memory 26 stores the digital image data and digital sound data from the decoding circuit 25, and the route change-over switch 27 connects picture D/A converter 28 or the line memory 29 of the frame memory 26. Picture D/A converter 28 changes digital image data into an analog picture signal, the line memory 29 stores temporarily the digital sound data from the frame memory 26, and voice D/A converter 30 changes the digital sound data from the line memory 29 into an analog voice signal and outputs it. The control circuit 31 controls the playback equipment 24, the decoding circuit 25, the frame memory 26 and the route change-over switch 27.

[0032]

The operation is explained about the picture sound reproduction device constituted as mentioned above. The operation in this Embodiment 4 takes the reverse procedure of the operation in 1st and 3rd embodiments. Namely, if the code data of the picture recorded on the



recording medium 22 and a sound is coded according to the procedure shown by the 1st embodiment, this is read with the playback equipment 24 and it decodes in the decoding circuit 25. As shown on drawing 2 explained by the 1st embodiment, where digital image data and digital sound data are mixed, it is written in the frame memory 26. In order to display image data, connection by the route change-over switch 27 is changed to the picture D/A converter 28 side at the effective display period of a picture, the digital image data stored in the field equivalent to the image display region of the frame memory 26 is read and it changes into an analog picture signal, and outputs from output terminal T3. Digital sound data is stored in the field equivalent to the picture non display regions of the frame memory 26, by changing connection by the route change-over switch 27 to the line memory 29 during the picture blanking period, a certain 1 scanning line period or during the 2 scanning lines, it is written in the line memory 29 temporarily. The digital sound data written in the line memory 29 temporarily is read with a fixed clock (the 1st embodiment, 8 kHz), is changed into an analog voice signal by voice D/A converter 30, and is outputted from the output terminal T4.

[0033] Although the thing equivalent to the subtractor 20 in the 2nd embodiment, an adder was not made into the component in this Embodiment 4, it may be made to arrange an adder between the line memory 29 and voice D/A converter 30. This adder adds digital difference data one by one, and obtains the original digital sound data.

[0034]

Since the code data of the picture collectively recorded on the recording medium 22 and a sound is decoded and it was made to change into an analog from digital as mentioned above according to this Embodiment 4, the code data of the picture recorded collectively and a sound can be reproduced to the signal of an analog image and an analog voice and the built database can be used.

[0035]

(Embodiment 5) Drawing 7 is a block diagram showing the image voice communication device by a 5th embodiment of this invention. In drawing 7, Picture A/D converter 14, voice A/D converter 15, the transmission line memory 16, the transmitting side route change-over switch 17, the transmitting frame memory 18, the encoding circuit 19, the decoding circuit 25, the receiving frame memory 26, the receiver route change-over switch 27, picture D/A converter 28, since the receiving line memory 29 and voice D/A converter 30 are the same as that of drawing 1, drawing 5, and drawing 6, explanation is omitted. But, the line memories 16 and 29, the route change-over switches 17 and 27, and the frame memories 18 and 26, the transmitting side attaches the character of transmission or the transmitting side, and the receiver attaches the character of reception or a receiver. The line circuit 32 transmits and receives the code data of a picture and a sound by a communication line and the control circuit 33 controls the route change-over switches 17 and 27, the frame memories 18 and 26, the encoding circuit 19,

the decoding circuit 25 and the line circuit 32. The mentioned above image A/D converter 14, voice A/D converter 15, the transmission line memory 16, the transmitting side route change-over switch 17, the transmitting frame memory 18 and the encoding circuit 19 are of the same composition as the picture voice recording device of drawing 5, and constitute a transmission part. The mentioned above decoding circuit 25, the receiving frame memory 26, the receiver route change-over switch 27, picture D/A converter 28, the receiving line memory 29, and voice D/A converter 30 are of the same composition as the picture sound reproduction device of drawing 6, and constitute a receive part.

[0036]

The operation is explained about the image voice communication device constituted as mentioned above. Operation of a transmission part is the same as that of the picture voice recording device of drawing 5, and the analog picture signal and analog voice signal that were inputted via the input terminal T1 and T2 are changed into digital image data and digital sound data, compression encoding is carried out by the encoding circuit 19, and the code data of a picture and a sound is transmitted to the other party image voice communication device linked to a communication line through the line circuit 32. Operation of a receive part is the same as that of the picture sound reproduction device of drawing 6, decodes the code data of the picture and sound that were received from the other party image voice communication device by the line

circuit 32 in the decoding circuit 25, and obtains digital image data and digital sound data. Such digital data is changed into an analog picture signal and an analog voice signal by picture D/A converter 28 and voice D/A converter 30 and is outputted from output terminal T3 and T4.

[0037]

Although the thing equivalent to the 2nd subtractor 20 and subtractor 20 in an embodiment, an adder was not made into the component in this Embodiment 5, a subtractor may be arranged between voice A/D converter 15 and the transmission line memory 16, and it may be made to arrange an adder between the receiving line memory 29 and voice D/A converter 30.

[0038]

As mentioned above, compression encoding of image data and the voice data can be carried out collectively and can transmit to the other party image voice communication device via a communication line according to this Embodiment 5. Since extension decoding of the coding data of the picture and sound that received from the other party image voice communication device via the communication line can be carried out collectively, circuit structure can be conventionally made small for the required voice encoding circuit, a voice decoding circuit, and a demultiplexing circuit as an unnecessary thing.

A lip sync circuit becomes unnecessary and much smaller scaling can be achieved. Namely, in the conventional image voice communication device, since coding of a picture and a sound and the decoding circuit

were separate, the lip sync circuit for the output timing of an audio picture shifting, and there is a problem that sense of incongruity arises, delaying voice data as the measure, and taking the synchronization with a picture and a sound was required. However, the encoding circuit 19 and the decoding circuit 25 are one, in this embodiment, they bundle up the data of a picture and a sound inputted simultaneously, coding processing is carried out and since it is collectively decoded by the data of a picture and a sound also in decoding processing, the output timing of a picture and a sound does not shift. For this reason, the required lip sync circuit becomes unnecessary conventionally.

[0039]

[Effect of the invention] Since compression encoding of image data and the voice data can be carried out collectively as mentioned above according to the picture voice to digital converter of this invention, the required voice encoding circuit, a demultiplexing circuit and a lip sync circuit can be conventionally made unnecessary and the advantageous effect that circuit structure can be made small is achieved. Since variation of voice data can be made less than an audio signal from the first by taking the difference of digital sound data and the immediately before digital sound data, the advantageous effect that compression efficiency can be raised is achieved.

[0040]

The coding data of a picture and a sound can be collectively recorded on an external recorder according to the picture voice recording device of this invention,

the advantageous effect that a database with a picture and a sound can be built is achieved.

[0041]

The code data of the picture recorded collectively and a sound is renewable to the signal of an analog image and an analog voice according to the picture sound reproduction device of this invention, the advantageous effect that the built database can be used is achieved.

[0042]

According to the image voice communication device of this invention, compression encoding of image data and the voice data can be carried out collectively, and can transmit to the other party image voice communication device via a communication line. The extension decoding of the coded data of the picture and sound that were received from the other party image voice communication device via the communication line can be carried out collectively, the required voice encoding circuit, a demultiplexing circuit and a lip sync circuit can be conventionally made unnecessary, and the advantageous effect that circuit structure can be made small is achieved.

[Brief description of the drawings]

[Drawing 1] is the block diagram showing the picture voice to digital converter by the 1 embodiment of this invention.

[Drawing 2] is the stored data figure showing the data storage state in a frame memory.

[Drawing 3] is the block diagram showing the picture voice to digital converter by the 2nd embodiment of this invention.

[Drawing 4] (a) is the voice sampling figure showing the sampling timing of an audio signal.

(b) is the difference data figure showing digital difference data.

[Drawing 5] is the block diagram showing the picture voice recording device by the 3rd embodiment of this invention.

[Drawing 6] is the block diagram showing the picture sound reproduction device by a 4th embodiment of this invention.

[Drawing 7] is the block diagram showing the image voice communication device by a 5th embodiment of this invention.

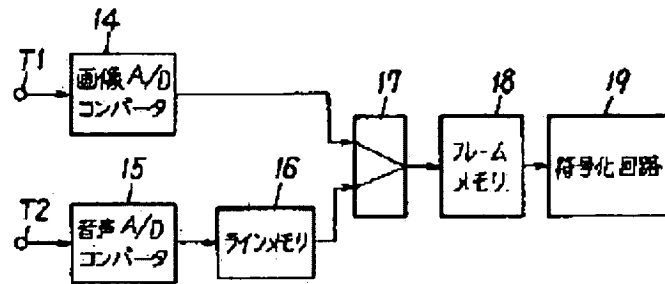
[Drawing 8] is the block diagram showing the conventional image voice communication device.

[Description of notations]

- 14 Picture A/D converter
- 15 Voice A/D converter
- 16 Line memory (transmission line memory)
- 17 Route change-over switch (transmitting side route change-over switch)
- 18 Frame memory (transmitting frame memory)
- 19 Encoding circuit
- 20 Subtractor
- 21 Recorder
- 22 Recording medium
- 23 Control circuit
- 24 Playback equipment
- 25 Decoding circuit
- 26 Frame memory (receiving frame memory)
- 27 Route change-over switch (receiver route change-over switch)
- 28 Picture D/A converter
- 29 Line memory (receiving line memory)
- 30 Voice D/A converter
- 31, 33 Control circuit
- 32 Line circuit
- S1 Image data storage area
- S2 Voice data storage area
- T1, T2 Input terminal
- T3, T4 Output terminal



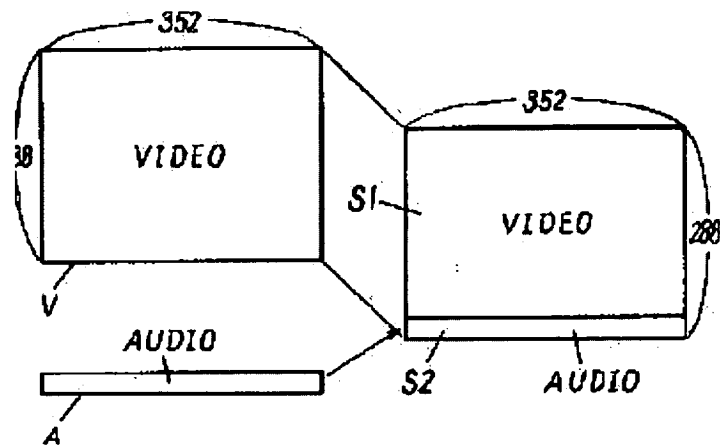
Drawing 1



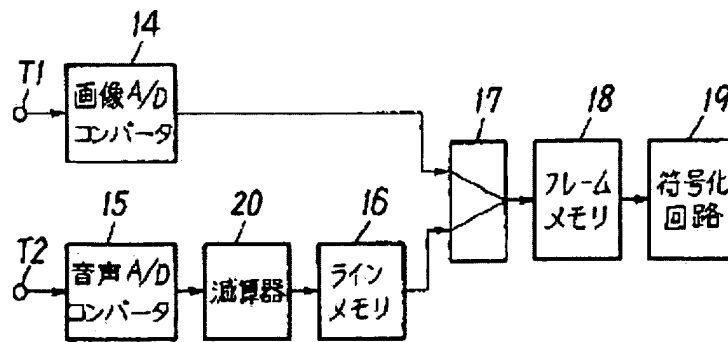
T1、T2 入力端子

17 経路切替スイッチ

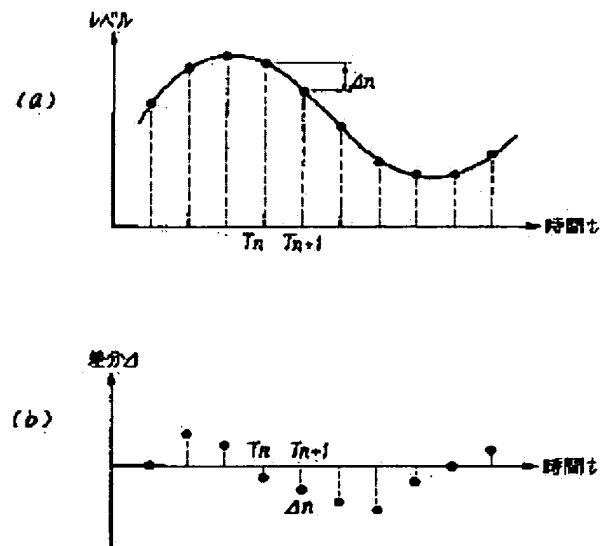
Drawing 2



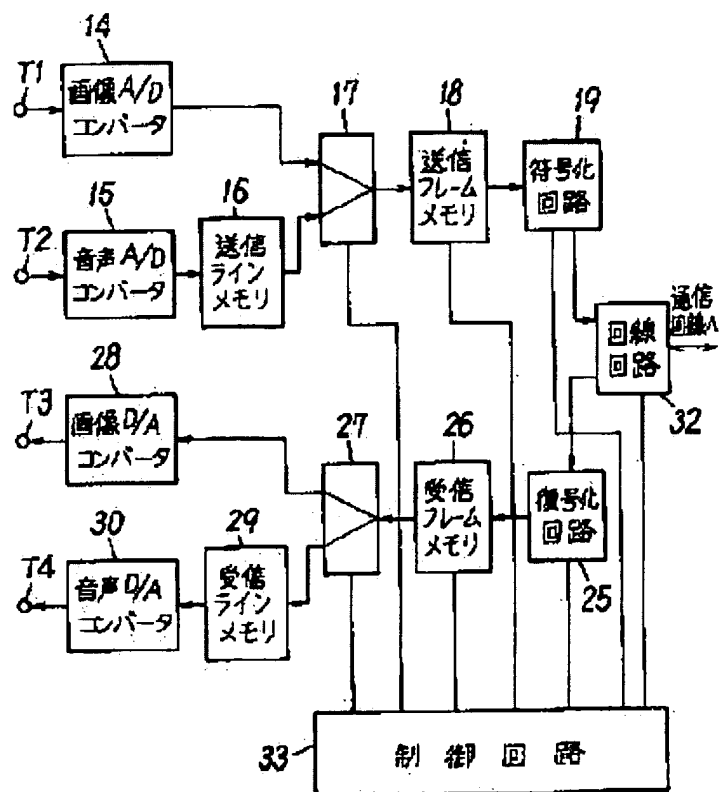
Drawing 3



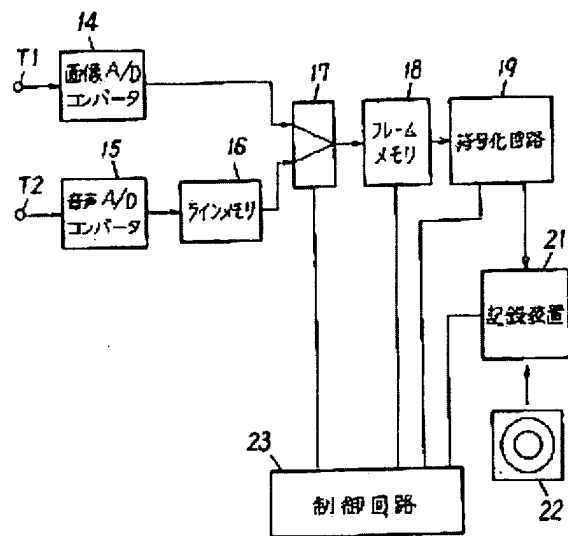
Drawing 4



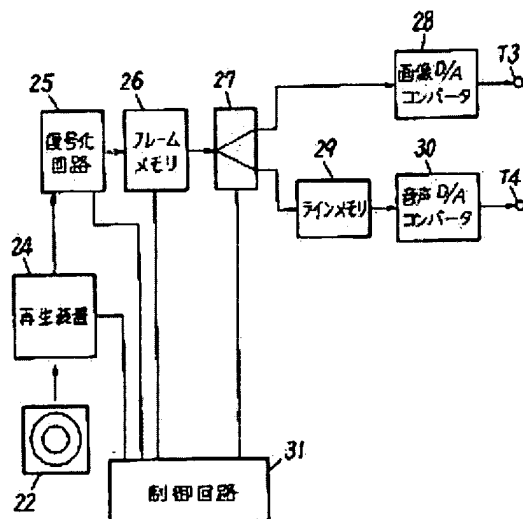
Drawing 7



Drawing 5



Drawing 6



Drawing 8

